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ANALYSIS OF ERTS-1 IMAGERY OF WYOMING AND ITS APPLICATION TO EVALUATION OF
WYOMING'S NATURAL RESOURCES

D. L. Blackstone, Jr.
Department of Geology
University of Wyoming
Laramie, Wyoming 82070

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16. Abstract Structurally linear elements in the vicinity of the Rock Springs Uplift, Sweetwater County, Wyoming are reported for the first time. One element trends N 40° W near Farson, Wyoming and the other N 65° E from Rock Springs. These elements confirm the block-like or mosaic pattern of major structural elements in Wyoming.					
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Figure 2. Technical Report Standard Title Page

TECTONIC ANALYSIS OF SOUTHWESTERN WYOMING FROM ERTS-1 IMAGERY

The imagery from the ERTS-1 satellite allows for the inspection of a large array of tectonic elements in a space situation whereby the mutual relationships of the features can be easily related and analyzed. Figure 1 is an index map showing approximate coverage of the transparency relative to political boundaries and principal towns.

Examination of the positive transparency No. 1013-17300-5, August 5, 1972, Rock Springs Uplift area, Wyoming and those immediately adjacent reveals two previously unreported tectonic features.

Note: The term linear elements is here used to describe a markedly linear geologic feature which to date is not fully defined as to the precise character -- (i.e. fault, fold, etc.)

1. A linear element trends about N. 40° W. (320°) and passes approximately through the common corner of Townships 25, 26, N., and Ranges 105-106 W., 6th Principal Meridian, Wyoming. The element passes approximately 4 miles northeast of the community of Farson, Sweetwater County, Wyoming and will be referred to by the name Farson element.
2. A linear element trending N 65° E (65°) and aligned northeastward from the town of Rock Springs, Sweetwater County, Wyoming, and thence across the Red Desert to a point near Lamont, Carbon County Wyoming, referred to by the name Red Desert element.

The two linear elements are inferred at this time to represent the surface trace of deep seated structural elements, probably faults, which increase in magnitude of displacement with depth. The element passing near Farson is

INDEX MAP

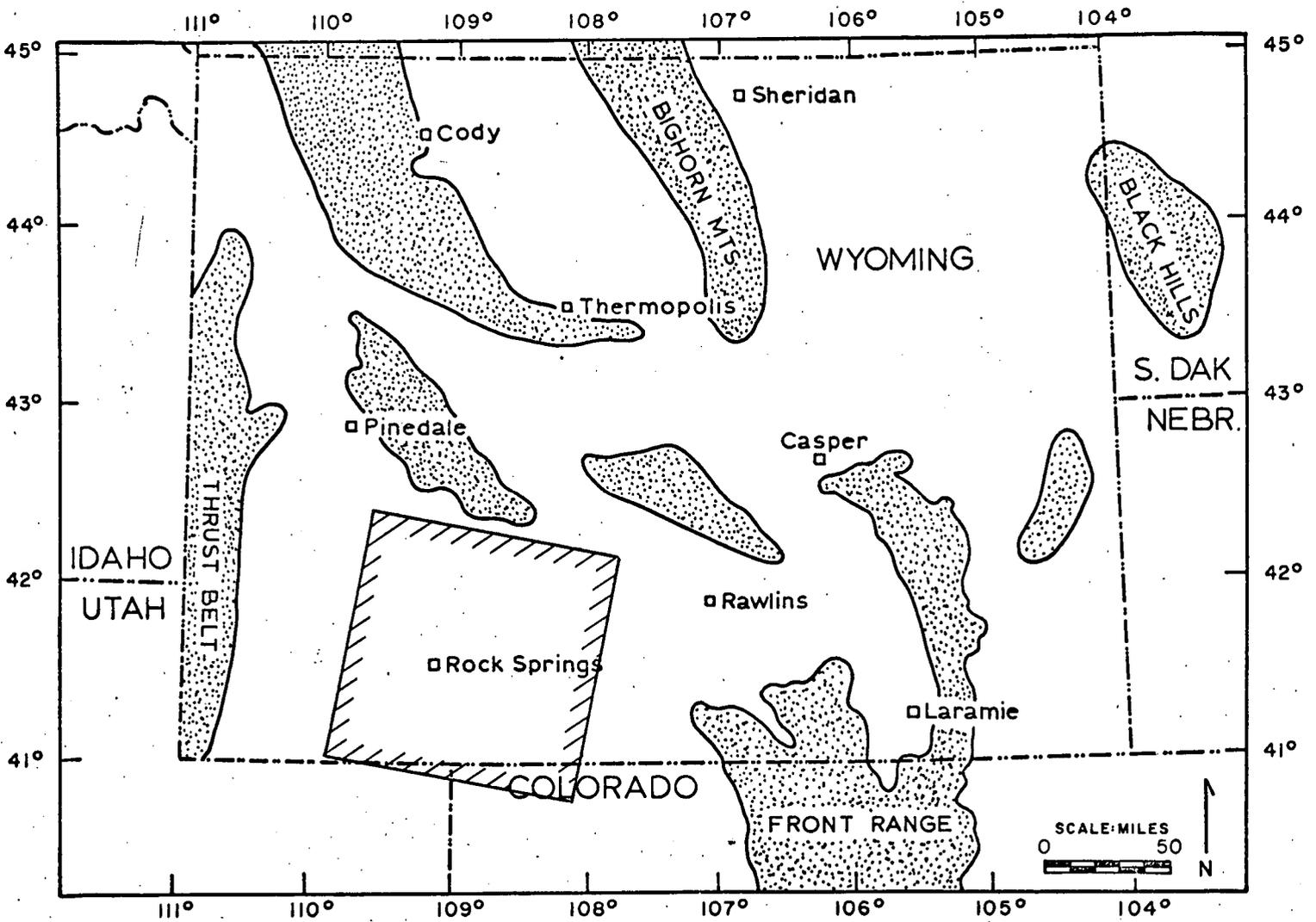


Figure 1

subparallel to the zone of normal faulting previously mapped at Tabernacle Butte (McGrew & Berman, 1955). The linear element continues southeastward into the area of the Leucite Hills volcanic field (Kemp, 1897, Kemp & Knight, 1903) as is shown on Figure 2. The northeast flank of the Rock Springs Uplift as far south as the Black Buttes station on the U.P.R.R. is also aligned with this trend.

Two interpretations of the data are made.

- a. The Leucite Hills volcanic vents are associated with and possibly controlled by the Farson linear element.
- b. The Farson structural element was active in Laramide time delimiting the northeast flank of the Rock Springs Uplift; and must have continued active until the eruption of the Leucite Hills volcanic products in Pliocene time. The volcanic rocks are dated as 1.25 m.y. by Bradley (1961).

The second structural element trends northeastward from Rock Springs, crosses the Rock Springs Uplift (Fig. 2), and extends across the Red Desert-Great Divide Basin to the east. The east flank of the Rock Springs Uplift is ruptured by numerous high angle reverse faults (Schultz, 1909) with northeast strikes. It should be noted that previously mapped and documented structural elements having the same structural trends exist in southeast Wyoming. The Como Bluff (Dunbar, 1944) to Pinto Creek faulted anticlinal trend (Kaabar, 1971) is a very prominent feature displacing the Precambrian basement rocks along its eastern extent in the Laramie Mountains. The Mullen Creek part of the Mullen Creek-Nash Fork shear zone (Houston, 1968) in the northern Medicine Bow Mountains, Wyoming, also has the same orientation. The

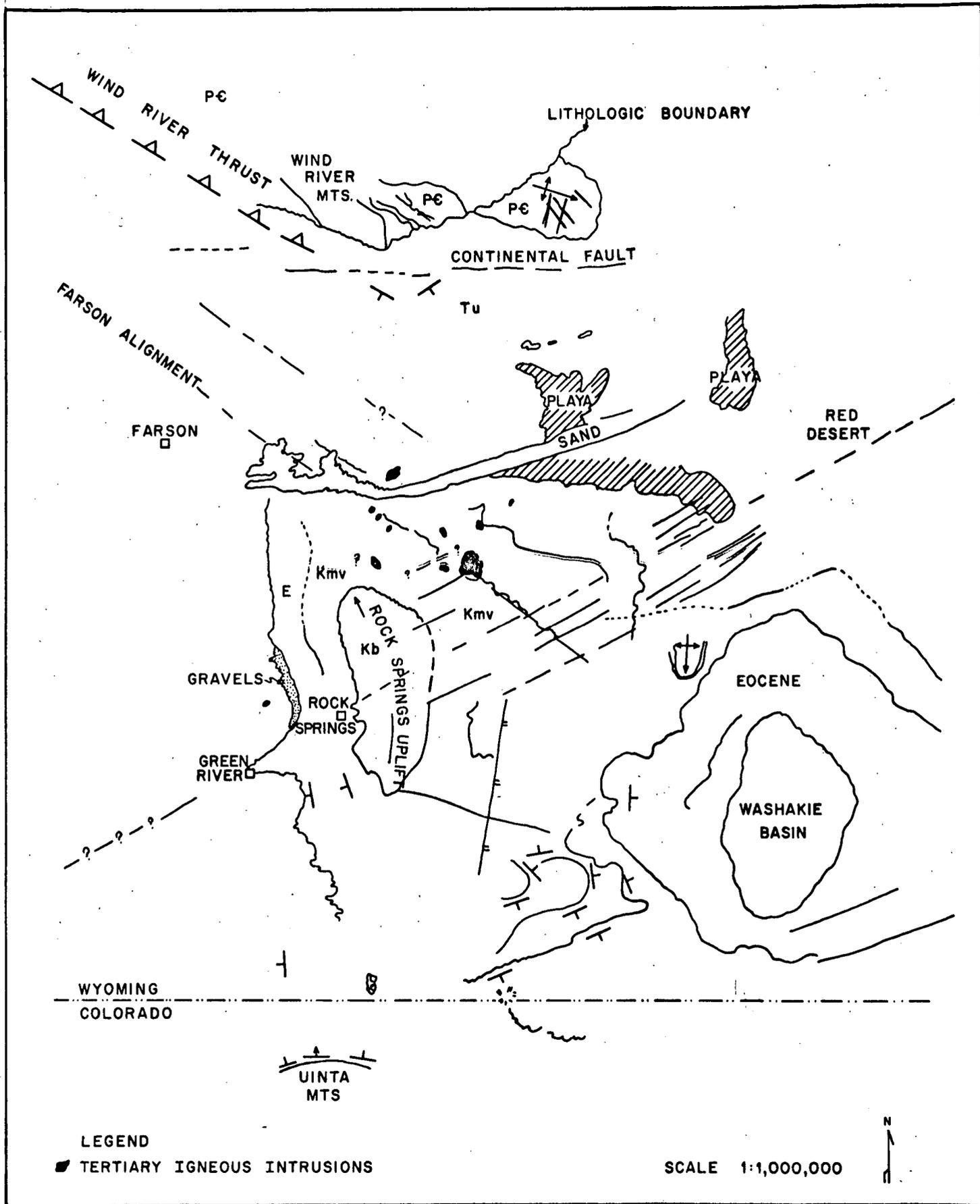


Figure 2

rather poorly defined Wyoming lineament (Ransome, 1915; Blackstone, 1951) is a zone of structural discontinuity that is also roughly parallel to the Rock Springs element.

The Precambrian rock exposures of the northern Laramie Mtns. terminate along a faulted syncline at Deer Creek southeast of Casper, Wyoming which is exactly on the northeastward extension of the Rock Springs-Red Desert linear element. There is no evidence of structural disturbance where the projected alignment crosses the Ferris-Seminole Mountains in central Wyoming.

The significance of the Rock Springs-Red Desert element is that it further documents a system of northeast trending structural elements in SE Wyoming which have had a profound effect upon the delineation of the tectonic pattern.

In terms of interpreting the Laramide tectonic pattern of Wyoming the new data reinforces the concept that the pattern is best compared to a mosaic of blocks; and that the blocks are bounded by structural elements which have a limited number of orientations, probably not more than six.

Regional tectonic implications for origins of the tectonic patterns in Wyoming have been suggested by several investigators (Blackstone, 1963; Malahoff and Moberly, 1968; Sales, 1968). The basic question to be resolved is whether the major tectonic elevations and depressions of the crust in the Rocky Mountain foreland are due to a compressive, horizontally directed stress field or a stress field reflecting dominantly vertical motion.

The existence of major subparallel linear elements, extending for tens of miles suggests a compressive stress field over large areas, at least in the early stages of the regional deformation.

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